Physics
DIP0LE-DIPOLE INTERACTIONS IN MAGNTOCARCINOTHERAPY (MCT)

Marwan M Rihaoui
E-mail: mmrihawy@yahoo.com
Department of Physics, Winona State University, Winona, MN, 55987
Advisor: **J Carl Kumaradas***
Biological and Quantum Physics, Los Alamos National Laboratory, Los Alamos, NM, 87545
LA-UR # 03- 4996

Abstract

Several new techniques for the treatment of cancer are being developed. One of these is Magnetocarnicotherapy (MCT) which is being developed in the Biological and Quantum Physics group (P-21) at LANL. MCT combines the detection, imaging, and treatment of cancer by using magnetic nanoparticles bound to monoclonal antibodies. The particles are administrated to the patient through the blood stream where they bind to tumor cells. Tumors can then be detected and imaged using Superconducting Quantum Interference Devices (SQUIDs) or Magnetic Resonance Imaging (MRI).

The particles which are magnetic dipoles can be made to rotate by applying an external rotating magnetic field. The frictional force of the particles with the surrounding medium will cause a temperature rise that can kill tumor cells (by coagulation).

My research studies the effect of the dipole-dipole interactions on the heating efficiency in MCT. This can be done by comparing the strength of the magnetic field produced by rotating particles with the external rotating magnetic field. A computer model has been developed to simulate the magnetic field and heat deposition properties of particles using the finite difference method. The heating efficiency versus the particles spacing and the heating efficiency versus the external magnetic field as well as the motion of the particles will be presented.